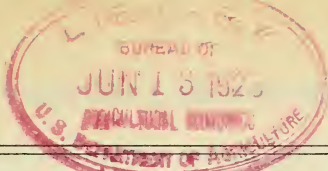


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GROUNDING COTTON GINS TO PREVENT FIRES

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In some seasons the loss from cotton-gin fires in the United States is in the neighborhood of one and one-fourth million dollars. Apparently Arkansas, North Carolina, Oklahoma, Texas, and Georgia suffer the greatest losses. In spite of the investigational, experimental, and educational work relating to fires in cotton gins conducted by the United States Department of Agriculture,¹ State institutions, insurance companies and underwriters, and other interested agencies, fires in such plants still occur too frequently. This is due not to ignorance of the causes of the conflagrations,² but almost entirely to the fact that the methods and devices for prevention found to be effective by field tests have not been universally adopted.

CAUSES OF COTTON-GIN FIRES.

Fires during the ginning process may be due to a number of causes, such as static electricity, matches in the cotton, overheated bearings, friction between the saws and cotton stuck in the ribs, and sparks struck by the passage through the equipment of pieces of metal and other foreign material.

The crop and climatic conditions during the 1922 ginning season in Texas make it possible to refute the oft-repeated statement that matches in the cotton cause most of the fires during the ginning process. Matches can and have caused many fires in gins, but they are not responsible for the great numbers which have occurred in certain seasons. Making proper allowance for the law of averages in connection with the presence of matches in cotton and the existence of average conditions, such as cotton dry enough to burn when brought in contact with a flame, and assuming that there are no other causative factors, the number of fires during the ginning process each year should be uniform. Such is not the case. During the season of 1922 in Texas the temperature was high and the cotton was exceptionally dry, but the number of fires was comparatively

¹ U. S. Dept. Agr. Cir. 28 (1919).

² Dust Explosions, D. J. Price and H. H. Brown, pp. 181-190 (1922).

small. Generally speaking, the cotton was remarkably clean and, in contrast with the conditions prevailing during other seasons when a large number of fires occurred, there were no periods of sustained low humidities, with the exception of one of four days.

Static electricity is the principal cause of fires during the ginning process. This is shown by the fact that in the seasons when the greatest number of fires have occurred electrostatic charges have been abundant. At such times low humidities prevailed and the cotton being ginned was particularly dry and dirty. During the periods when few fires occurred electrostatic charges have been conspicuously absent.

When the humidity is low and the cotton is both dry and dirty high charges of static electricity are common in the unloading and distributing systems, cleaners, lint flues, saw and brush shafts, and practically all belts. The simultaneous occurrence of these three conditions—low humidity, dry cotton, and dirty cotton—is essential for the existence of high electrostatic charges in the gin.

GROUNDING SYSTEM FOR GINS.

The United States Department of Agriculture strongly recommends a grounding system, good housekeeping, and the proper operation and maintenance of equipment for preventing fires during the ginning process. The grounding system described in Department Circular 28 is inexpensive and effective and its general utilization will do much to decrease the number of fires occurring annually during the ginning process.

Figure 1 shows this system, slightly modified, with several minor changes suggested by the 1922 field work. For grounding the saw, brush, and cleaner shafts, a wire firmly seated under the head of one of the journal bolts is adequate; a brush contact is unnecessary. The use of the brush contact, however, will remove the remote possibility that the oil film in the bearing might give trouble as an insulating medium.

The installation of a good grounding system requires clean, tight contacts and connections. The best of systems, no matter how carefully installed, will be practically useless if not properly maintained. Too often contacts and connections become and remain loose, and wires break and are not replaced.

In the modified grounding system for gins (Fig. 1) two ground rods (1 and 2) are used. These rods, preferably iron rods (pointed), at least three-eighths of an inch in diameter, or pipe (pointed), about three-fourths of an inch in diameter, should be driven approximately 4 feet into the ground. In dry weather the surface soil around the rods should be slightly cupped out and water should be poured in from time to time.

Starting with the cleaner, it is desirable to ground each shaft of the boll breakers, at *A* and *B*, the shaft of the beater (paddle) at *C*, the screen, top and bottom, at *D* and *E*, the suction pipe (for over-flow cotton) at *F*, the suction pipe at *G*, the suction pipe leading to the cotton storage house at *H*, and the unloading pipe at *J* and *K*, above and below the flexible canvas joint.

A good arrangement is to attach a No. 10 insulated wire at *B*, run it along the cleaner and under the Y-shaped union of suction

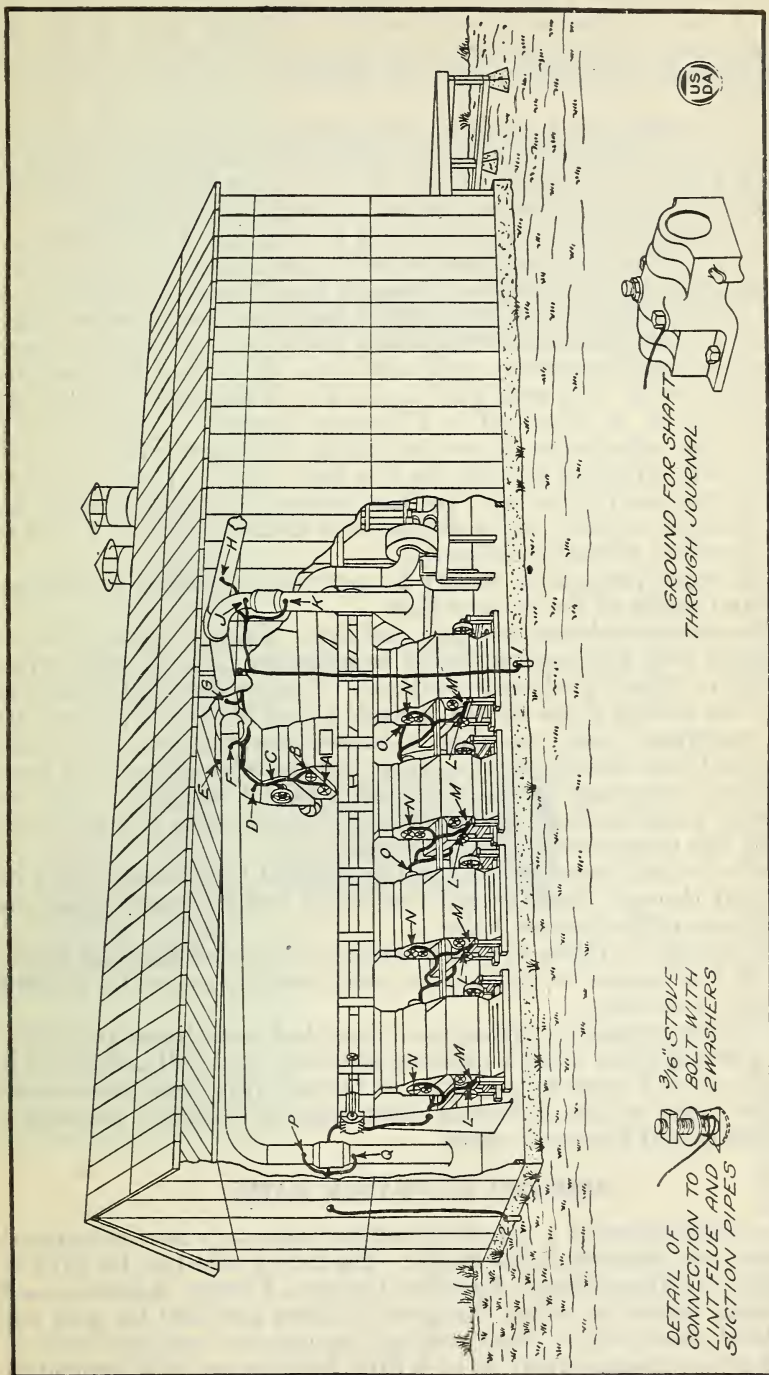


FIG. 1.—Wiring system for grounding cotton gins.

pipes, out through a small hole in the near-by wall, and down the side of the building to ground rod 1. Suitable leads of No. 14 insulated wire should be run from appropriate points along this main wire to the various points of contact at *A, C, D, E, F, G, H, J, and K*.

Contacts should be made also to the brush shaft at *L*, the saw shaft at *M*, and the screen of the cleaner feeder at *N* of each gin stand, to the lint flue at *O* (2 contacts), and to the suction pipe (for overflow cotton) at *P* and *Q*, above and below the flexible canvas joint.

A very satisfactory arrangement is to attach a No. 10 insulated wire at *O* (to the horizontal section of the lint flue at the large end), and pass this wire around it in three or four extended spirals to the small end of the flue. At this point the wire should be extended upward to the top of the overflow end of the belt distributor, across to and through the near-by wall, and down the side of the building to ground rod 2. For each gin stand a No. 14 insulated wire should be attached at *M*, extended to *L*, passed upward to unite with a similar wire attached at *N*, and extended to connect with the main No. 10 wire wrapped around the lint flue. A No. 14 wire should connect this No. 10 wire with the lint flue at *O* (between the second and third gin stands), and a similar wire should extend to *P* and *Q* from the main wire at that location.

As an extra precaution, it may be desirable to ground the suction pipes and shafts of the various fans.

All connections should be bright and firm. The connection of wires to ground rods and screens should be soldered, those to other wires soldered or taped, preferably soldered. Connections to the lint flue and to the suction pipes should be made either (1) by cutting a suitable triangular hole, inserting a three-sixteenths-inch stove bolt (head and one washer inside), wrapping the wire around the bolt, and tightly drawing up the nut over a second washer, or (2) by soldering a flat-headed one-fourth-inch stove bolt to the pipe and making the wire firm as in the first case.

Shafts in the cleaner, as well as the saw and brush shafts, may be grounded through their journals by wires firmly seated under the head of one of the journal bolts.

Care should be taken to attach wires to the outer side and at the edge of the screens in the cleaner and cleaner feeders to prevent clogging or choking.

While the grounding system here described is designed primarily for a ginning plant using a cleaning separator and boll breaker, belt distributor, and brush gins, it can be adapted, with slight alterations, to other types of plants having other types of cleaners, pneumatic distributor, and pneumatic gins.

REDUCED INSURANCE RATES.

The effectiveness of a proper grounding system is now recognized by insurance interests in the South. The rating schedule for gins in Virginia, North and South Carolina, Georgia, Florida, Alabama, and Louisiana carries an added charge of 25 cents per \$100 for gins not grounded effectively. Some mutual companies insuring gins in Texas give a 15-cent credit on each \$100 for gins properly grounded.

